

Comparison of commercial fishery discard estimates
for SNE/MA winter flounder

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TOR B. Commercial Fishery Discards.

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Commercial Fishery Discard Estimates for SNE/MA Winter Flounder

In the SARC 21 assessment of SNE/MA winter flounder (NEFSC 1996), the Stock Assessment Review Committee (SARC) concluded that there were too few Fishery Observer sampled trips in which winter flounder were caught to adequately characterize the overall ratio of discards to landings in the commercial fishery. The Fishery Observer sample length frequency data, however, were judged adequate to help characterize the proportion discarded at length. In the SARC 21 assessment, commercial discards for 1985 to 1993 were estimated from length frequency data from NEFSC and the Massachusetts Division of Marine Fisheries (MADMF) bottom trawl surveys, commercial port sampling of landings at length and Fishery Observer sampling of landings and discard at length. The method follows an approach described by Mayo et al. (1992). The year was divided into half year periods. Survey length frequency data (MADMF survey in spring and NEFSC in fall) were smoothed using a three point moving average, then filtered through a mesh selection ogive (Simpson 1989) for 4.5 in mesh (1984-1989), 5 in mesh (1990-1992, fall 1993) or 5.5 in mesh (spring, 1993). The 5.5 in mesh selection curve was calculated using the 5 in curve adjusted to an L_{50} for 5.5 in mesh. The choice of mesh sizes was based on sizes used in the yellowtail assessment for southern New England (Rago et al. 1994) and comparison to length frequencies of commercial landings. The mesh filtering process resulted in a survey length frequency of retained winter flounder. A logistic regression was used to model the percent discarded at length from 1989-1992 sea sampling data, and the resulting percentages at length were applied to the survey numbers at length data to produce the survey-based equivalent of commercial kept and discarded winter flounder. The 1989-1992 average percentage discard at length was applied to 1985-1988. The survey numbers per tow at length "kept" were then regressed against commercial numbers landed at length. The linear relationship was calculated for those lengths common to both length frequencies and fitted with an intercept of zero. The slope of the regression provided a conversion factor to re-scale the survey "discard" numbers per tow at length to equivalent commercial numbers at length. The resulting vector of number of fish discarded at length was multiplied by a discard mortality rate of 50% (as averaged in Howell et al., 1992) to produce the vector of fish discarded dead at length per half year. The number of dead discards at length was adjusted by the ratio of weighout landings to total commercial landings and summed across seasons and lengths (and corresponding weight at length) to produce the annual total number and weight of commercial fishery discards for 1985-1993. In the SARC 28 assessment (NEFSC 1999), this same method using the 4.5 in mesh ogive and 1989-1992 average discard percentage at length was used to estimate commercial fishery discards for 1981-1984. This approach (and the previously estimated values) will be retained in the current assessment for estimates of the 1981-1993 commercial fishery discards.

During ASMFC Winter Flounder Technical Committee meetings since 1995, the group has considered the SARC 21 survey length-mesh selection method, NEFSC Fishery Observer data (OB), and NER Vessel Trip Report (VTR) data as sources of information to use in the estimation of commercial fishery discards, with a focus on the latter two sources. The Committee examined the characteristics of both the Fishery Observer and VTR discard data (number of trip samples, frequency distributions of discards to landings ratio per trip, mean and

variance of annual half-year discards to landings ratio), and concluded that the VTR mean discard to landed ratio aggregated over all trips in annual half-year season strata (January to June, July to December) provided the most reliable data from which to estimate commercial fishery discards. VTR trawl gear fishery discards to landings ratios on a half-year basis (January to June; July to December) were applied to corresponding commercial fishery landings (all gears) to estimate discards in weight for 1994 and later years. VTR discard ratios for winter flounder for other gears (scallop dredge, gillnet) were judged to be too variable to provide reliable estimates of discards.

For the current assessment, the National Bycatch Report (see GARM Working Paper Wigley et al. 2007) estimation approach D2 has been applied for comparison with OB and VTR discard rate estimation methods for 1994 and later years. Discard rates by half-year were calculated for trawls and scallop dredges, and applied to the corresponding landings (winter flounder landings for the OB and VTR rates; landings of all species for the NBRD2 rates).

OB discard rate estimates were higher and more variable than discard estimates from the VTR and NBRD2 methods, which were generally of about the same order of magnitude (Tables 1-13; Figures 1-4). In particular, the 1999 and 2000 OB discard estimates appear to be infeasible.

If the VTR and NBRD2 discard estimates are examined by gear, it is apparent that the scallop dredge estimates generally make up a larger part of the NBRD2 estimate total when compared to the VTR estimates (Figures 5-6). The scallop dredge fishery lands a small amount of SNE/MA winter flounder (<35 mt annually) compared to the trawl fishery (1,200-4,600 mt annually), and so even though the VTR scallop dredge discard rates can be high, the discard estimates are relatively low. In previous assessments neither the OB nor VTR discard rate data were considered adequate for the estimation of discards specific to the scallop dredge fishery, due to sample size and inter-annual variability of the rates. By contrast, the NBRD2 scallop dredge discard estimates are quite variable and can be much larger than the trawl discard estimates, in spite of a low discard rate (discard of winter flounder to total landings of all species), because of the large magnitude of total landings in the fishery and the sensitivity of the discard estimate calculation to small inter-annual changes in the absolute discard rate.

Wigley et al. (2007) indicated that the NBRD2 estimate of landings for winter flounder (3,186 mt) was comparable to the Dealer reported landings (3,667) for 2005, with the 95% confidence interval (2,606-3,767 mt) encompassing both the Dealer landings and the VTR reported landings (3,477). In spite of concerns associated with each of the discard estimation approaches, the above combined factors suggest that the NBRD2 approach is likely to be the most accurate for the estimation of commercial fishery discards for SNE/MA winter flounder.

References

Wigley, S.E., M.C.Palmer, J. Blaylock and P.J. Rago. 2007. A brief description of the discard estimation for the National Bycatch Report. GARM Data Review Meeting Working Paper.

Table 1. SNE/MA Winter Flounder Discard Estimation Comparison: 1994

1994				
Landings		Trawl	Dredge	Total
Semi				
	1	1156	3.00	
	2	995	5.00	
Total		2151	8.00	2159
Discards				
Trawl				
OB				
Semi	d/k	D(mt)		
	1	0.304	351	
	2	2.474	2462	
Total			2813	
VTR				
Semi	d/k	D(mt)		
	1	0.252	291	
	2	0.100	100	
Total			391	
NBR D2				
Semi		D(mt)		
	1		70	
	2		221	
Total			291	
Dredge				
OB				
Semi	d/k	D(mt)		
	1	0.664	1.99	
	2	0.857	4.29	
Total			6.28	
VTR				
Semi	d/k	D(mt)		
	1	0.560	1.68	
	2	2.122	10.61	
Total			12.29	
NBR D2				
Semi		D(mt)		
	1		11	
	2		22	
Total			33	
Total			2819	
				403
				324
				CV= 118

Table 2. SNE/MA Winter Flounder Discard Estimation Comparison: 1995

1995				
Landings		Trawl	Dredge	Total
Semi				
	1	708	8.00	
	2	1894	24.00	
Total		2602	32.00	2634
Discards				
Trawl				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	0.043	30	
	2	0.289	547	
Total			578	Total 115
Dredge				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	0.509	4.07	
	2	1.817	43.61	
Total			47.68	Total 85.51
Total			625	201
				279
				CV= 39

Table 3. SNE/MA Winter Flounder Discard Estimation Comparison: 1996

1996				
Landings		Trawl	Dredge	Total
Semi				
	1	815	7.00	
	2	1941	18.00	
Total		2756	25.00	2781
Discards				
Trawl				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	0.358	292	Semi 1 56
	2	0.115	223	2 63
Total			515	Total 119
Dredge				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	4.220	29.54	Semi 1 206
	2	6.842	123.16	2 184
Total			152.70	Total 390
Total			668	512
				509
				CV= 24

Table 4. SNE/MA Winter Flounder Discard Estimation Comparison: 1997

1997				
Landings		Trawl	Dredge	Total
Semi				
	1	865	7.00	
	2	2553	16.00	
Total		3418	23.00	3441
Discards				
Trawl				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	0.175	151	
	2	0.018	46	
Total			197	Total
Dredge				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	36.801	257.61	
	2	20.366	325.86	
Total			583.46	Total
Total			781	702
				1722
				CV= 48

Table 5. SNE/MA Winter Flounder Discard Estimation Comparison: 1998

1998			
Landings	Trawl	Dredge	Total
Semi			
1	957	9.00	
2	2227	15.00	
Total	3184	24.00	3208
Discards			
Trawl			
OB			
VTR			
NBR D2			
Semi	d/k	D(mt)	
1	0.305	292	
2	0.273	608	
Total		900	
Semi	d/k	D(mt)	
1	0.265	254	
2	0.292	650	
Total		904	
Semi			
1			145
2			104
Total			249
Dredge			
OB			
VTR			
NBR D2			
Semi	d/k	D(mt)	
1	7.325	65.93	
2	13.048	195.72	
Total		261.65	
Semi	d/k	D(mt)	
1	6.730	60.57	
2	6.189	92.84	
Total		153.41	
Semi			
1			416
2			523
Total			939
Total		1162	
		1057	
			1188
		CV=	48

Table 6. SNE/MA Winter Flounder Discard Estimation Comparison: 1999

1999				
Landings		Trawl	Dredge	Total
Semi				
	1	1158	6.00	
	2	2275	5.00	
Total		3433	11.00	3444
Discards				
Trawl				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	11.842	13713	Semi 1 48
	2	0.005	11	2 46
Total			13724	Total 94
Dredge				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	37.213	223.28	Semi 1 127
	2	15.703	78.52	2 265
Total			301.79	Total 392
Total			14026	739
				486
				CV= 29

Table 7. SNE/MA Winter Flounder Discard Estimation Comparison: 2000

2000										
Landings		Trawl		Dredge		Total				
Semi										
	1	1116		3.00						
	2	2674		7.00						
Total		3790		10.00		3800				
Discards										
Trawl										
OB						VTR		NBR D2		
Semi	d/k		D(mt)			Semi	d/k	D(mt)	Semi	D(mt)
	1	0.100	112			1	0.160	179	1	70
	2	0.040	107			2	0.043	115	2	72
Total			219			Total		294	Total	142
Dredge										
OB						VTR		NBR D2		
Semi	d/k		D(mt)			Semi	d/k	D(mt)	Semi	D(mt)
	1	3147.800	9443.40			1	7.244	21.73	1	151
	2	286.930	2008.51			2	4.777	33.44	2	135
Total			11451.91			Total		55.17	Total	286
Total			11670					349		428
									cv=	0.21

Table 8. SNE/MA Winter Flounder Discard Estimation Comparison: 2001

2001				
Landings		Trawl	Dredge	Total
Semi				
	1	1547	2.00	
	2	3135	3.00	
Total		4682	5.00	4687
Discards				
Trawl				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	0.039	60	Semi 1 24
	2	0.036	113	2 24
Total			173	Total 48
Dredge				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	0.003	0.01	Semi 1 36
	2	0.004	0.01	2 2
Total			0.02	Total 38
Total			173	207
				86
				cv= 20

Table 9. SNE/MA Winter Flounder Discard Estimation Comparison: 2002

2002				
Landings		Trawl	Dredge	Total
Semi				
	1	1388	0.27	
	2	1748	0.04	
Total		3136	0.31	3136
Discards				
Trawl				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	0.049	68	Semi 1 61
	2	0.005	9	2 55
Total			77	Total 116
Dredge				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	0.002	0.00	Semi 1 3
	2	1.114	0.04	2 96
Total			0.05	Total 99
Total			77	222
				215
				CV= 28

Table 10. SNE/MA Winter Flounder Discard Estimation Comparison: 2003

2003																													
Landings		Trawl		Dredge		Total																							
Semi																													
		1	797	0.05																									
		2	1630	0.21																									
Total		2427		0.26		2427																							
Discards																													
Trawl																													
OB																													
					VTR			NBR D2																					
Semi		d/k		D(mt)		Semi		d/k		D(mt)		Semi		D(mt)															
		1	0.042	33				1	0.095	76				1	31														
		2	0.015	24				2	0.282	460				2	30														
Total				58				Total			535			Total	61														
Dredge																													
OB										VTR										NBR D2									
Semi		d/k		D(mt)				Semi		d/k		D(mt)				Semi		D(mt)											
		1	0.649	0.03						1	0.583	0.03						1	304										
		2	0.694	0.15						2	17.242	3.62						2	321										
Total				0.18						Total			3.65					Total	625										
Total				58								539				686													
																				cv=				45					

Table 11. SNE/MA Winter Flounder Discard Estimation Comparison: 2004

2004				
Landings		Trawl	Dredge	Total
Semi				
	1	550	0	
	2	908	0	
Total		1458	0	1458
Discards				
Trawl				
OB				
Semi	d/k	D(mt)		
	1	0.255	140	
	2	0.068	62	
Total			202	
VTR				
Semi	d/k	D(mt)		
	1	0.086	47	
	2	0.025	23	
Total			70	
NBR D2				
Semi		D(mt)		
	1		79	
	2		74	
Total			153	
Dredge				
OB				
Semi	d/k	D(mt)		
	1	8.116	0	
	2	0.621	0	
Total			0	
VTR				
Semi	d/k	D(mt)		
	1	3.106	0	
	2	3.106	0	
Total			0	
NBR D2				
Semi		D(mt)		
	1		13	
	2		30	
Total			43	
Total			202	
				70
				196
			cv=	19

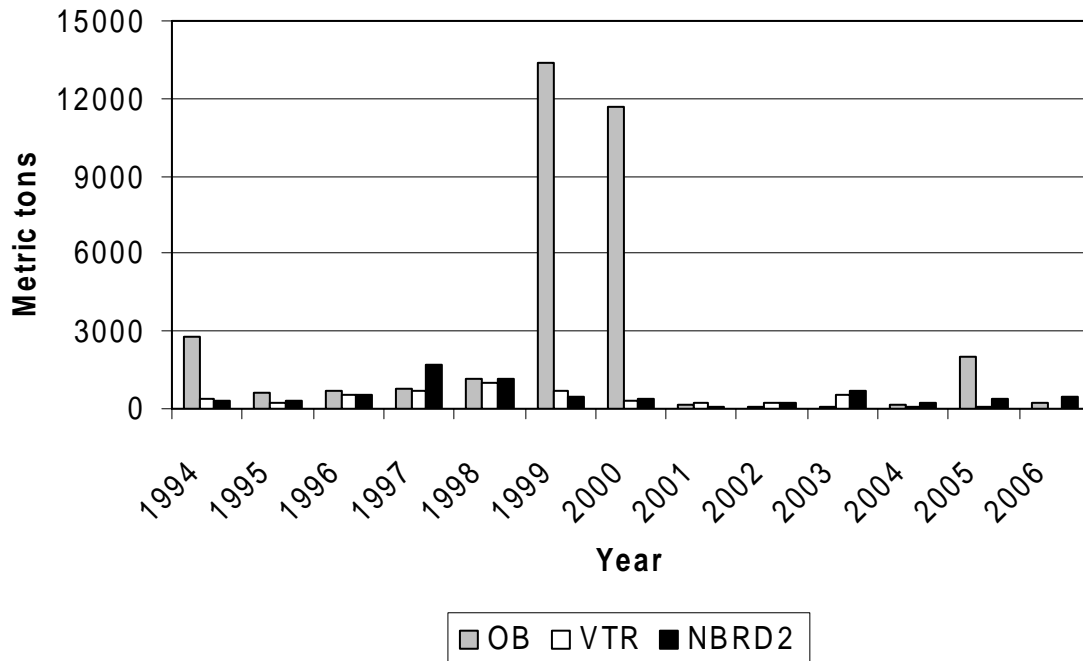
Table 12. SNE/MA Winter Flounder Discard Estimation Comparison: 2005

2005				
Landings		Trawl	Dredge	Total
Semi				
	1	331	10	
	2	880	9	
Total		1211	19	1230
Discards				
Trawl				
OB				
	d/k	D(mt)		
Semi				
	1	0.080	26	
	2	0.039	34	
Total			60	
VTR				
	d/k	D(mt)		
Semi				
	1	0.040	13	
	2	0.016	14	
Total			27	
NBR D2				
		D(mt)		
Semi				
	1	104		
	2	166		
Total		270		
Dredge				
OB				
	d/k	D(mt)		
Semi				
	1	23.070	231	
	2	195.040	1755	
Total			1986	
VTR				
	d/k	D(mt)		
Semi				
	1	3.443	34	
	2	0.132	1	
Total			35	
NBR D2				
		D(mt)		
Semi				
	1	41		
	2	111		
Total		152		
Total			2046	
			62	
			cv=	11
				422

Table 13. SNE/MA Winter Flounder Discard Estimation Comparison: 2006

2006				
Landings		Trawl	Dredge	Total
Semi				
	1	438	1	
	2	1212	2	
Total		1650	3	1653
Discards				
Trawl				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	0.230	101	Semi 1 84
	2	0.148	179	2 76
Total			280	Total 160
Dredge				
OB				
				VTR
				NBR D2
Semi	d/k	D(mt)		Semi d/k D(mt)
	1	1.200	1	Semi 1 120
	2	18.060	36	2 178
Total			37	Total 298
Total			317	61
				458
				cv= 13

Figure 1: SNE/MA WFL Discards



**Figure 2: SNE/MA WFL Discards:
VTR and NBRD2 only**

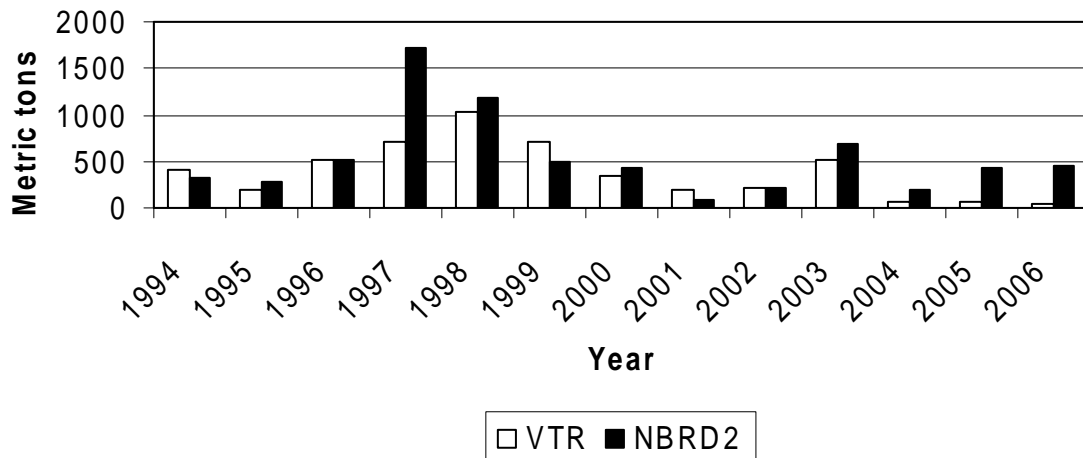


Figure 3: SNA/MA WFL Discards

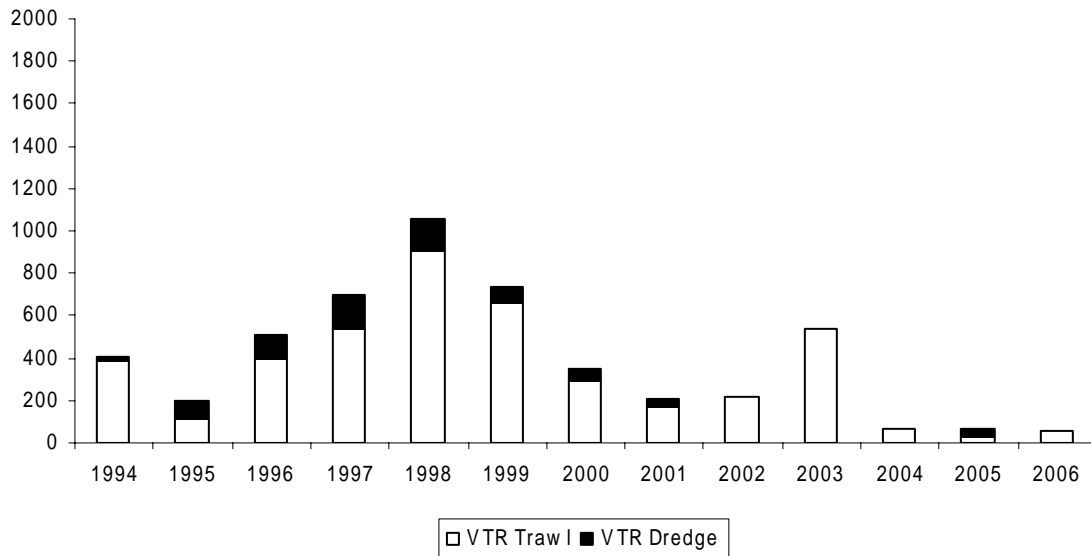


Figure 4: SNE/MA WFL Discards

